Assessing the Impact of Continuous Quality Improvement/Total Quality Management: Concept versus Implementation

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Objective. This study examines the relationships among organizational culture, quality improvement processes and selected outcomes for a sample of up to 61 U. S. hospitals.
Data Sources and Study Setting. Primary data were collected from 61 U.S. hospitals (located primarily in the midwest and the west) on measures related to continuous quality improvement/total quality management (CQI/TQM), organizational culture, implementation approaches, and degree of quality improvement implementation based on the Baldrige Award criteria. These data were combined with independently collected data on perceived impact and objective measures of clinical efficiency (i.e., charges and length of stay) for six clinical conditions.
Study Design. The study involved cross-sectional examination of the named relationships.
Data Collection/Extraction Methods. Reliable and valid scales for the organizational culture and quality improvement implementation measures were developed based on responses from over 7,000 individuals across the 61 hospitals with an overall completion rate of 72 percent. Independent data on perceived impact were collected from a national survey and independent data on clinical efficiency from a companion study of managed care.
Principal Findings. A participative, flexible, risk-taking organizational culture was significantly related to quality improvement implementation. Quality improvement implementation, in turn, was positively associated with greater perceived patient outcomes and human resource development. Larger-size hospitals experienced lower clinical efficiency with regard to higher charges and higher length of stay, due in part to having more bureaucratic and hierarchical cultures that serve as a barrier to quality improvement implementation.
Conclusions. What really matters is whether or not a hospital has a culture that supports quality improvement work and an approach that encourages flexible implementation. Larger-size hospitals face more difficult challenges in this regard.

Key Words. CQI/TQM, organizational culture, quality improvement implementation, Baldrige criteria, outcome measurement

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In response to national and local managed care pressures and reform initiatives, health care organizations are searching for ways to deliver more cost-effective, higher-quality care, including the application of industrial quality control principles to the provision of health care services. (Berwick 1989; Berwick, Godfrey, and Roessner 1990; Laffel and Blumenthal 1989). Known as continuous quality improvement (CQI) or total quality management (TQM), the hope is that widespread implementation of the underlying philosophy, approaches, and tools of CQI/TQM will result in an ability to both maintain and improve quality while controlling increases in costs.

The key elements in a combined definition of CQI/TQM include continuous improvement, customer focus, structured processes, and organization-wide participation. CQI/TQM differs from the traditional quality assurance in many ways; among the most important is CQI/TQM's focus on understanding and improving underlying work processes and systems versus the traditional quality assurance emphasis on correcting after-the-fact errors of individuals.

Considerable interest has been expressed by hospital leaders in adopting the CQI/TQM approach. In fact, a recent national survey of 3,303

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hospitals indicates that 69 percent have actively begun to implement the basic components of CQI/TQM (Barsness, Shortell, Gillies, et al. 1993) with 75 percent of these efforts having been launched in the past two years. Although there is a growing descriptive and prescriptive literature regarding the implementation of CQI/TQM in health care organizations (cf. Berwick, Godfrey, and Roessner 1990; Kaluzny, McLaughlin, and Kibbe 1992; Kaluzny and McLaughlin, 1992; Wakefield and Wakefield 1993; Joint Commission on Accreditation of Healthcare Organizations (JCAHO) 1992; Sahney and Warden 1991), no systematic evidence exists as yet to demonstrate CQI/TQM's superiority to existing or alternative approaches to quality assurance and improvement (Lohr 1990; Shortell et al. 1995).

The present study addresses this gap by systematically examining quality improvement efforts in 61 hospitals. Using a variance theory perspective (Mohr 1982; Kaluzny, McLaughlin, and Jaeger 1993), the research focuses on factors influencing the implementation of quality improvement activities and the perceived impact on human resources development, patient care outcomes, and financial outcomes. In addition, for a subset of 38 hospitals the relationships between CQI involvement, the degree of quality improvement implementation, and implementation approach (i.e., prospector, analyzer, defender, etc.) with length of stay and charges for acute myocardial infarction (AMI), chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), pneumonia, total hip replacement, and stroke are examined. The following sections describe the study's framework and hypotheses, methods, results, and implications.

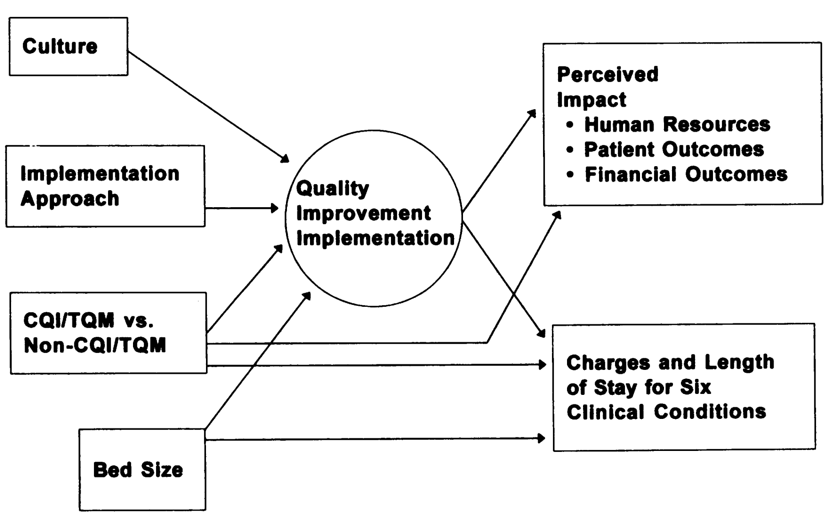
STUDY FRAMEWORK AND EXPLORATORY HYPOTHESES

The overall framework for the study is shown in Figure 1 where the degree of quality improvement (QI) implementation as measured by employee judgments based on Baldrige Award criteria (U.S. Chamber of Commerce 1993) is viewed as a function of hospital size, culture, implementation approach (i.e., prospector, analyzer, defender, etc.), and whether or not the hospital is formally involved in CQI/TQM. In turn, the perceived impact on performance (i.e., human resources development, patient outcomes, and financial outcomes) and charges and length of stay for six clinical conditions (i.e., clinical efficiency) are viewed as a function of the degree of QI implementation. Also, whether or not a hospital uses CQI/TQM is expected to have a direct effect on the perceived impact and clinical efficiency measures, and bed size is expected to have a direct effect on clinical efficiency. Thus, the independent variables are hospital culture, use of CQI/TQM, implementation approach, and bed size; the intervening variable is degree of QI implementation; and the dependent variables are the perceived impact and objective clinical efficiency measures. The rationale for these hypothesized relationships is now discussed.

THE CQI/TQM HYPOTHESIS

Hospitals whose CEOs and directors of Quality Assurance/Improvement reported active incorporation of and involvement with *all five* CQI/TQM principles: (1) a focus on underlying organizational processes and systems as causes of failure rather than blaming individuals; (2) the use of *structured* problem-solving approaches based on statistical analysis; (3) the use of cross-functional employee teams; (4) employee empowerment to identify problems and opportunities for improved care and to take the necessary action; and (5) an explicit focus on both internal and external customers (cf. Deming 1987; Juran 1988; Berwick, Godfrey, and Roessner 1990; and

Figure 1: Study Framework for Assessing the Impact of Quality Improvement



Batalden 1989) were considered to be CQI/TQM sites. It was felt that these hospitals, due to their emphasis on these principles would be further along in their efforts to implement quality improvement and would experience greater perceived impact on various organizational outcome measures and objective performance measures for selected clinical conditions. Thus, the first hypothesis:

H1. Hospitals using an overall CQI/TQM approach to quality improvement will experience a greater degree of QI implementation; greater perceived impact of CQI/TQM on human resources development, patient outcomes, and financial outcomes; and greater clinical efficiency in terms of lower charges and length of stay for selected clinical conditions.

THE CULTURE HYPOTHESIS

Culture is defined as the values, beliefs, and norms of an organization that shape its behavior. It is commonly believed that successful implementation of CQI/TQM requires a significant commitment to a culture emphasizing empowerment, autonomy, and risk taking (Gaucher and Coffey 1993; Heilpern and Nadler 1992; O'Connor, Boerstler, and Foster 1994; McLaughlin and Kaluzny 1990). Existing research suggests that such cultures are associated with higher-performing intensive care units with regard to efficiency of utilization and perceived outcomes of cases (Shortell, Zimmerman, Rousseau, et al. 1994). Based on the underlying values of organizational members, Quinn and Kimberly (1984) defined four cultural types: a *group culture* based on norms and values associated with affiliation, teamwork, and participation; *a developmental culture* based on risk-taking innovation and change; *a hierarchical culture* reflecting the values and norms associated with bureaucracy; and *a rational culture* emphasizing efficiency and achievement. Given the emphasis of QI efforts on empowering individuals to make decisions and on promoting communication across departments and functions, it is felt that cultures emphasizing group and developmental components will be more conducive to implementing QI efforts. Thus, the second hypothesis:

H2. The greater the degree to which hospitals possess a group/developmental-oriented culture the greater the degree of QI implementation.

THE IMPLEMENTATION APPROACH HYPOTHESIS

Implementation approach was based on the original Miles and Snow (1978) typology classifying organizations as defenders, analyzers, prospectors, and reactors based on a largely ordinal scale subsequently described (Meyer, Brooks, and Goes 1990; Shortell, Morrison, and Friedman 1990; Zajac and Shortell 1989).

A *defender* approach involves fine-tuning the organization's existing quality assurance/improvement approaches. In the defender approach, physicians play fairly traditional quality assurance roles focusing primarily on external accreditation requirements.

An *analyzer* approach to implementing quality improvement follows a relatively ordered sequence of steps from top management training to lower-level employee training in which only a few highly focused QI projects would be undertaken at one time and carefully evaluated before further activities were initiated. The *prospector* approach emphasizes seizing opportunities as they arise but within an overall planned framework of implementation. In the prospector approach, physicians are trained and involved in the processes as needs arise ("just-in-time") training, so that the training becomes immediately useful.

In a *reactor* or *opportunistic* approach, quality improvement techniques and approaches may be used to address problems, but they are not part of an overall plan. Physicians operate within largely traditional roles, primarily reacting to immediate quality problems with little generalization of learning to other situations. Overall, given the requirements of quality improvement (e.g., process focus, teams, empowerment, and customer focus), we believe that approaches that are more like those of the analyzer or prospector will be associated with a greater degree of implementation than those of the defender or reactor/opportunistic and, hence, the third hypothesis outlined below:

H3. Hospitals using analyzer and prospector-like implementation approaches are likely to experience a greater degree of QI implementation than those using more defender-like or opportunistic approaches.

THE IMPLEMENTATION-PERFORMANCE LINKAGE HYPOTHESIS

Whether or not CQI/TQM becomes another management fad may ultimately depend on the quality of its implementation. It is measured by employee evaluations of quality improvement activities based on the Baldrige Award (U.S. Chamber of Commerce 1993) categories involving leadership, information and analysis, human resources utilization, quality management, and strategic quality planning. The extent to which employees believe these activities are actually occurring in the organization are hypothesized to be positively associated with greater perceived impact on organization performance and more efficient use of resources for selected clinical conditions. Hence hypothesis four:

H4. The greater the degree of QI implementation, the greater the degree of perceived impact on human resources development, patient outcomes, and financial outcomes, and the greater the clinical efficiency as measured by lower charges and length of stay for the six clinical conditions.

OTHER FACTORS

Bed size is included in the model recognizing that charges might be higher and length of stay longer for the selected clinical conditions due to the overhead costs and greater degree of teaching activity frequently associated with larger-size hospitals. Also, implementing quality improvement efforts may be more difficult in larger-size hospitals due to the higher number of organizational levels and greater complexity of operation.

METHODS

SAMPLE

Sixty-one of sixty-seven hospitals affiliated with the Western Network's Center for Health Management Research participated in the study. Fifty-eight of the hospitals belonged to systems and the remaining three were freestanding independent hospitals.

Thirty-five percent of the hospitals are teaching hospitals (national average, 18 percent); 23 percent have a medical school affiliation (national average, 10 percent); and 8 percent are members of the Council of Teaching Hospitals (national average, 6 percent). Average bed size was 223 compared with 181 nationally. The average occupancy rate was 55 percent compared with 65 percent nationally. Thus, while the sample is not randomly selected, it is generally comparable to hospitals nationally with regard to bed size and occupancy rate, and more involved, at the same time, in teaching activities than hospitals are nationally.

MEASURES

CQI/TQM versus Other Approaches

Using the five criteria defining CQI/TQM noted previously–emphasis on systems and processes rather than individuals; data-driven problem-solving approaches; use of cross-organizational teams, empowerment, and customer focus–37 hospitals characterized themselves as CQI/TQM users through a baseline questionnaire completed by the hospital CEO and the person in charge of the hospital's quality assurance/improvement efforts. The remaining 24 hospitals reported using more traditional approaches to quality assurance and improvement. It is important to note that all five criteria had to be present for the hospital to be considered as a CQI/TQM site. The baseline responses were partially validated through discussions with advisory committee members involving representatives from participating organizations, and through on-site visits to ten hospitals. The 61 percent positive CQI/TQM response within this group approaches the 69 percent national figure reported a year later (Barsness, Shortell, Gillies, et al. 1993).

Culture

Organizational culture was measured using a 20-item self-administered questionnaire developed by Zammuto and Krakower (1991) based on Quinn and Kimberly's original competing-values typology (1984) involving underlying dimensions of flexibility/control and external versus internal orientation. The survey asked respondents to distribute 100 points between various descriptions of what constitutes a group culture, a developmental culture, a hierarchical culture, and a rational culture. Cronbach's alpha for the group scale was .79; for the developmental scale .77; for the hierarchical scale .70; and for the rational scale .47. As an example, items for the group-oriented culture scale included these: (1) the hospital is a very *personal* place. It is a lot like an extended family; people seem to share a lot of themselves; (2) managers in the hospital are *warm* and *caring*. They seek to develop employees' full potential and act as their mentors or guides; (3) the glue that holds the hospital together is *loyalty* and *tradition*. Commitment to this hospital is high; (4) the hospital emphasizes *human resources*. High cohesion and morale in the organization are important; and (5) the hospital distributes its rewards *fairly equally* among its members. It is important that everyone from top to bottom be treated as equally as possible.

The culture inventory was administered to up to 200 hospital employees and staff in the departments and areas where the greatest degree of quality improvement work was occurring (e.g., medical-surgical, nursing, ER, operating room, labs, etc.). Employees were sampled from each of the departments on a proportional basis whereby the total number of employees for each department was divided by the total number of eligible employees on the hospital's list. This percent was then multiplied by the desired sample size (n = 200) to arrive at a final number of employees chosen per department. The overall completion rate was 72 percent (n = 7,337 respondents) with individual hospital response rates ranging from 56 percent to 100 percent, and responses by department ranging from 59 percent for operating room staff to 76 percent for billing employees. There were no significant differences in the overall distribution of respondents by department compared with the overall sample of questionnaires administered. Further, adjusting the Baldrige implementation scale and the culture measures by weighting them according to the proportion of respondents represented by each department at each hospital resulted in no statistically significant differences. Nor was response rate significant in explaining differences in the Baldrige implementation scale or culture variable. Point allocations for the group culture and developmental culture scales were combined due to their emphasis on both flexibility and involvement of people in forming the group/developmental measure of organizational culture predicted to be positively associated with a greater degree of QI implementation.

IMPLEMENTATION APPROACH

The approach used to implement quality improvement was measured by asking senior executives, quality improvement council members, and quality assurance committee members to respond to a series of questions involving their hospital's approach to implementation in regard to their approach to change, administrative orientation, employee involvement, department involvement, and physician involvement. These dimensions were measured on ordinal scales from 1 (defender-like) to 7 (prospector-like) with respondents circling a separate number if the approach of the hospital was best described as opportunistic. Since opportunists are by definition unpredictable, they were randomly assigned an ordinal value ranging from defender at the low end of the seven-point scale to prospector at the high end of the scale. Replies were received from an average of approximately 50 respondents per hospital, a response rate of 76 percent. In the present study, the overall average of the six scales is used as the measure of implementation approach.

QI IMPLEMENTATION

Implementation was measured by six scales based on a specially developed questionnaire that operationalized the Malcolm Baldrige National Quality Award Criteria (U.S. Chamber of Commerce 1993).[1] The specific criteria involve leadership, information and analysis, human resources management (two scales), quality management, and strategic quality planning. The Cronbach alpha reliabilities were: leadership ($\alpha = .93$); information and analysis ($\alpha = .86$); human resources utilization–empowerment ($\alpha = .80$); human resources utilization–education and training ($\alpha = .79$); strategic quality planning ($\alpha = .88$) and quality management ($\alpha = .85$). Given the high average correlation among the six scales ($r = .76$) an overall quality improvement implementation measure was computed based on averaging across the six scales. This measure was validated using independent data derived from a National Survey of Hospital Quality Improvement efforts (Barsness, Shortell, Gillies, et al. 1993). The Baldrige QI implementation measure was significantly associated ($r = .35$; $p \leq .05$) with a greater use of QI tools (e.g., cause-and-effect diagrams, pareto charts, etc.), a greater percentage of physicians participating in quality improvement project teams ($r = .32$; $p \leq .06$), and a greater percentage of hospital employees participating in quality improvement teams ($r = .34$; $p \leq .05$). These data provide evidence for the convergent validity of the Baldrige implementation measure.

Finally, in order to ensure that the culture and implementation data could be validly aggregated to the department level and that the department level data could be aggregated to the hospital level, analysis of variance tests were conducted to assess within-group versus between-group variance. At the department level, the η -squared's ranged from .01 to .04 with F-values ranging from 4.80 to 29.42 all significant at $P \leq .0001$. At the hospital level, the η -squared's ranged from .05 to .15 with F-values ranging from 6.0 to 19.34, all significant at $p \leq .0001$. Thus, the individually reported data represent valid measures of department and hospital level culture and quality improvement implementation activities. The focus of the current study is at the hospital level of analysis.

Performance Measures

Given the multidimensionality of organizational performance (Flood, Shortell, and Scott 1994), two sets of performance measures were used. The first involved assessment by the hospital CEOs and directors of Quality Assurance/Improvement of the QI impact on human resources development, patient outcomes, and financial outcomes (1 = no impact to 7 = high impact) based on factor analysis scales of multiple items asked on the National Survey of Hospital Quality Improvement efforts (Barsness, Shortell, Gillies, et al. 1993). The items were factor analyzed using principal components analysis with varimax rotation (Harman 1976), and only those items with factor loadings of .40 and higher yielding factors with eigenvalues above 1.0 were retained for analysis. The human resources development impact factor was composed of increased ability to recruit and retain nurses, increased physician commitment to the hospital, increased nursing staff satisfaction, improved hospital-physician relations, increased ability to recruit and retain physicians, reduced employee turnover, improved management skills and practices, and empowered front-line employees. The alpha scale reliability was .91.

The patient outcome impact scale included improved patient outcomes, reduced errors and inappropriate treatment, increased patient satisfaction, and improved continuity of patient care. The alpha scale reliability was .80. The financial impact scale included three items: reduced costs, improved productivity/efficiency, and increased profitability. The alpha scale reliability was .78.

We also examined selected objective measures of clinical efficiency using independently collected charge and length of stay data for acute myocardial infarction, chronic obstructive pulmonary disease, congestive heart failure, pneumonia, stroke, and total hip replacement for a subset of 38 study hospitals (Conrad, Lessler, Wickizer, et al. 1994). These conditions/procedures were selected because they represent a relatively high degree of practice variation, thus constituting good candidates for quality improvement interventions. They are also relatively high-cost/high-volume conditions and were among the conditions/procedures for which the study hospitals reported that the most quality improvement work was occurring. While cost data were not available, charge data are highly correlated with cost data, particularly when individual conditions are examined, as done here. The data were also adjusted for differences in patient severity using patient age, sex, and the severity of comorbid conditions specific to the primary diagnosis (Averill, Goldfield, and Steinbeck 1993). Outliers for length of stay and charges (±3 standard deviations) are eliminated from the analysis. Finally, licensed bed capacity was used to control for hospital size.

RESULTS

The descriptive statistics (means and standard deviations) for all study variables are shown in Table 1. Path analysis based on least squares regression analysis (Blalock 1964; Asher 1976) was used to test the four hypotheses in order to examine the direct and indirect effects of the variables in the model. The results for QI implementation are shown in Table 2. As indicated, both hospital culture and implementation approach are significantly and positively associated with a greater degree of QI implementation. Specifically, there is a significant association between hospitals with group/developmental cultures emphasizing teamwork, support, development of everyone's potential, and a willingness to undertake some degree of risk and the degree of reported QI implementation. Similarly, hospitals using a more prospector-like approach to implementation emphasizing decentralized control, empowerment, and "just-in-time" training of physicians report a greater degree of implementation. Thus, both hypothesis 2 pertaining to culture and hypothesis 3 pertaining to implementation approach are supported by the data. Neither bed size nor whether or not the hospital met all the criteria for being a CQI/TQM site are significantly associated with QI implementation. The overall fit of the model is quite good with 54 percent of the variation in QI implementation being explained by hospital culture and implementation approach. Additional analysis examining the effect of region (west versus all other), location (urban versus rural), and local market competition (number of HMOs, number of competing hospitals, percent of revenue from capitation) revealed these variables to be nonsignificant and did not change the culture/implementation results.

The results for the perceived outcome measures reveal significant associations for QI implementation in regard to human resources development ($\beta = .31$; $p \leq .10$) and patient outcomes ($\beta = .45$; $p \leq .01$) but not financial outcomes. Thus, there is partial support for hypothesis 4 regarding the predicted relationship between QI implementation and perceived outcomes.

Table 1: Descriptive Statistics

Variable	*Mean*	*s.d.*
Baldrige implementation scale	3.33	.15
CQI/TQM site	53.2%	50.00
Group/Developmental culture	46.0	14.85
Bed size	2.23	173.3
Implementation approach	3.36	1.00
Perceived human resource impact	3.38	1.10
Perceived patient outcomes impact	4.46	1.14
Perceived financial outcomes impact	4.05	1.33
LOS Stroke	5.77	1.94
LOS AMI	6.29	1.88
LOS Pneumonia	6.05	1.30
LOS COPD	5.47	1.61
LOS Hip replacement	6.89	1.22
LOS CHF	5.91	1.41
Charges Stroke	$7,828.00	$3,350.00
Charges AMI	$13,565.00	$7,450.00
Charges Pneumonia	$7,432.00	$2,613.00
Charges COPD	$6,571.00	$2,679.00
Charges Hip replacement	$15,728.00	$2,835.00
Charges CHF	$7,366.00	$2,789.00

Whether or not a hospital is a formal CQI site is not significantly associated with any of the perceived outcome scales, contrary to the prediction associated with the first hypothesis.

Tables 3 and 4 present the results for the length of stay and charge data for the six clinical conditions. Taking into account disease severity, the results reflect the pervasive influence of hospital bed size. Larger-size hospitals have both longer length of stay and higher charges for each condition. Whether or not a hospital is a formal CQI/TQM site, however, is significantly associated with lower length of stay and/or charges in 4 of the 12 equations and is consistently negative in all other equations. Thus, some support exists for the first hypothesis, suggesting that CQI/TQM sites would experience shorter length of stay and lower charges for selected clinical conditions. There is little support, however, for hypothesis 4, suggesting that the degree of QI implementation would be associated with shorter length of stay and lower charges. Only two predicted associations are observed (i.e., charges for stroke and length of stay for congestive heart failure). While the other relationships involving implementation are consistently in the

Table 2: QI Implementation Regression Results ($N = 60$)

Variable	*B (std. error)*	t-*Test*	*Beta*
CQI site	.023 (.037)	.63	.06
Culture	.018 (.002)	7.38***	.78
Implementation approach	.047 (.026)	1.81*	.17
Bed size	.001 (.001)	1.20	.13
Constant	2.25 (.153)	14.7***	
$\bar{R}^2$	.54		
F	18.0		
p	$\leq$.0001		

*$p \leq .10$; **$p \leq .05$; ***$p \leq .01$.

predicted direction (i.e., greater QI implementation associated with shorter length of stay and lower charges), they do not approach statistical significance. The major reason for this is that employees in larger-size hospitals report lower QI implementation than employees in smaller-size hospitals ($r = -.41$; $p \leq .05$). In fact, when bed size is deleted from the equation, QI implementation is significant in the predicted direction in 11 of the 12 equations. Additional analysis of the effects of region, location, and market competition did not change these relationships.

It is also important to note that culture and bed size are negatively correlated ($r = -.54$; $p \leq .05$), meaning that larger-size hospitals are less likely to have group/developmentally oriented cultures that emphasize teamwork, empowerment, risk-taking, and related attributes. Thus, the composite analysis of the relationships among bed size, culture, and QI implementation suggests that larger-size hospitals have more bureaucratic/rational cultures as opposed to group/developmental cultures, making it more difficult to implement QI activities as reported by their employees. While size dominates the relationships with clinical efficiency when both size and QI implementation are in the same equation, the data suggest that the underlying reason for this is that larger-size hospitals have cultures less conducive to implementing quality improvement work.

Table 3: Length of Stay Regression Results

	LOS Stroke (N = 37)			*LOS AMI* (N = 40)			*LOS Pneumonia* (N = 39)		
Variable	*B* (*std. error*)	t-*Test*	*Beta*	*B* (*std. error*)	t-*Test*	*Beta*	*B* (*std. error*)	t-*Test*	*Beta*
Severity adjustment	2.09 (0.82)	2.55**	0.40	1.36 (0.86)	1.58	0.18	1.11 (0.50)	2.23**	0.24
QI Implementation	−1.39 (1.59)	0.39	−0.14	−0.60 (1.10)	−0.54	−0.06	−0.91 (0.67)	−1.35	−0.15
CQI site	−0.53 (0.58)	−0.91	−0.14	−0.20 (0.45)	−0.441	−0.05	−0.52 (0.26)	−2.02**	−0.21
Bed size	0.003 (0.001)	1.69*	0.26	0.007 (0.001)	6.45***	0.72	0.004 (0.0007)	5.15***	0.58
Constant	6.71 (5.55)	1.21		3.79 (4.20)	0.90		6.05 (2.71)	2.23	
$\bar{R}^2$	0.27			0.59			0.60		
F	4.41			15.01			15.11		
p	≤.006			≤.0001			≤.0001		

Continued

Table 3: Continued

	LOS COPD (N = *38*)			*LOS Total Hip Replacement* (N = *34*)			*LOS CHF* (N = *39*)		
Variable	***B*** (*std. error*)	t-*Test*	*Beta*	***B*** (*std. error*)	t-*Test*	*Beta*	***B*** (*std. error*)	t-*Test*	*Beta*
Severity adjustment	0.53 (0.70)	0.76	0.08	2.62 (1.20)	2.18**	0.36	1.10 (0.80)	1.37	0.15
QI Implementation	−0.56 (1.03)	−0.55	−0.07	−0.11 (1.16)	−0.10	−0.02	−1.67 (0.78)	−2.14**	−0.24
CQI site	−0.93 (0.36)	−2.61***	−0.28	−0.36 (0.41)	−0.89	−0.14	−0.37 (0.31)	−1.21	−0.13
Bed size	0.006 (0.001)	5.53***	0.68	0.002 (0.001)	1.80*	0.31	0.004 (0.0008)	5.39***	0.61
Constant	5.31 (3.58)	1.48		3.62 (4.20)	0.86		8.35 (3.04)	2.75**	
$\bar{R}^2$	0.58			0.24			0.60		
F	13.93			3.09			15.16		
p	$\leq .0001$			$\leq .02$			$\leq .0001$		

*$p \leq .10$; **$p \leq .05$; ***$p \leq .01$.

Table 4: Charges Regression Results

	Charges Stroke (N = *34)*			*Charges AMI* (N = *38)*			*Charges Pneumonia* (N = *37)*		
Variable	*B* (*std. error)*	t-*Test*	*Beta*	*B* (*std. error)*	t-*Test*	*Beta*	*B* (*std. error)*	t-*Test*	*Beta*
Severity adjustment	345 (1347)	0.26	0.04	2010 (2822)	0.71	0.06	3355 (985)	3.41***	0.33
QI Implementation	−7587 (2999)	−2.53**	−0.37	−5628 (3926)	−1.43	−0.13	−316 (1494)	−0.21	−0.02
CQI site	−1395 (1002)	−1.39	−0.19	−2631 (1454)	−1.84*	−0.16	−797 (538)	−1.48	−0.14
Bed size	7.92 (2.72)	2.91***	0.43	33.65 (3.90)	8.63***	0.79	9.87 (1.49)	6.62***	0.69
Constant	31987 (10558)	3.03***		22323 (14531)			−569 (5879)	−0.10	
$\bar{R}^2$	0.43			0.74			0.68		
F	7.17			27.56			20.51		
p	$\leq .0004$			$\leq .0001$			$\leq .0001$		

Continued

Table 4: Continued

	Charges COPD (N = 35)			*Charges Total Hip Replacement (N = 32)*			*Charges CHF (N = 36)*		
Variable	*B (std. error)*	t-*Test*	*Beta*	*B (std. error)*	t-*Test*	*Beta*	*B (std. error)*	t-*Test*	*Beta*
Severity adjustment	435 (1254)	0.45	0.04	−6825 (3540)	−1.93*	−0.29	1547 (1229)	1.26	0.09
QI Implementation	−2702 (2040)	−1.32	−0.18	−3669 (2859)	−1.28	−0.21	−1831 (1234)	−1.48	−0.12
CQI site	−1083 (675)	−1.60	−0.19	−959 (895)	−1.07	−0.15	−1212 (450)	2.69***	−0.20
Bed size	9.83 (2.01)	4.90***	0.66	8.78 (2.75)	3.19***	0.55	12.60 (1.21)	10.40***	0.84
Constant	13161 (7419)	1.77*		34369 (10359)	3.32***		8257 (4518)	1.83*	
$\bar{R}^2$	0.55			0.36			0.81		
F	11.42			5.37			39.71		
p	≤.0001			≤.003			≤.0001		

*$p \le .10$; **$p \le .05$; ***$p \le .01$.

The path coefficients for the overall model using the reduced number of hospitals for which all data were available are shown in Figure 2. These visually depict the relationships discussed in the regressions although the beta or path coefficients differ slightly due to the changing number of observations.

DISCUSSION AND IMPLICATIONS

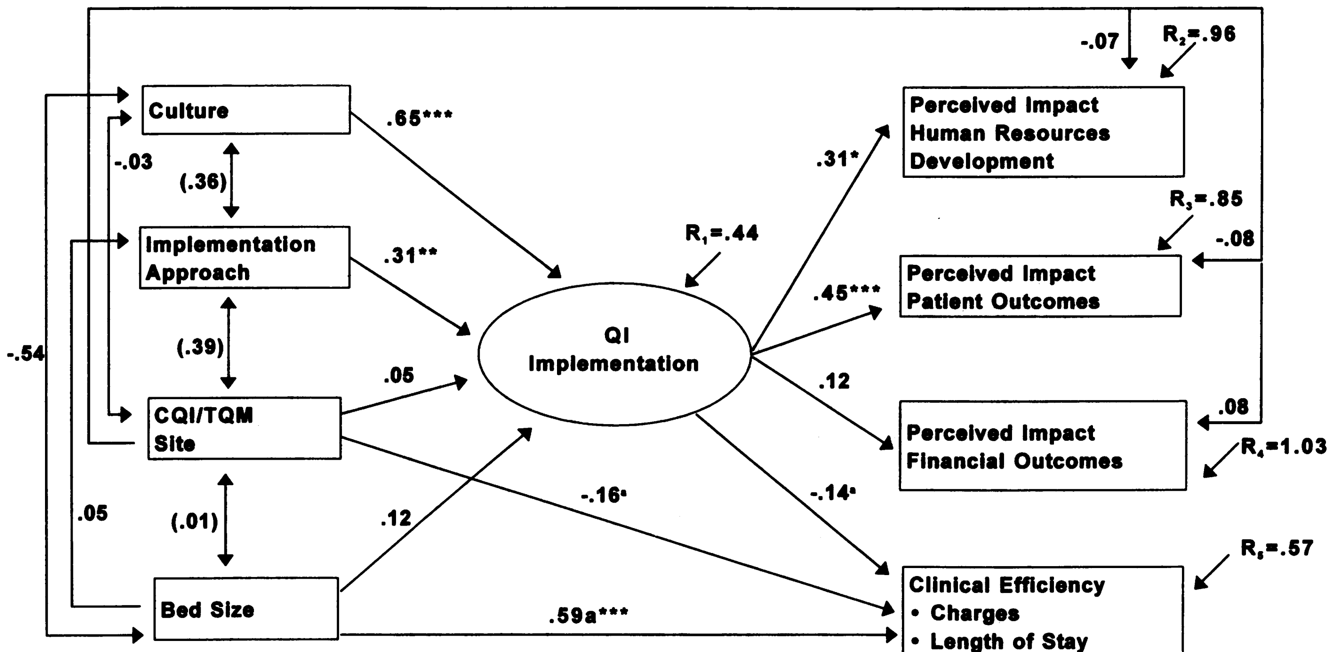
The implications of the findings reported in this article must be considered within the context of the study's limitations. First, while the sample contains a reasonable degree of diversity of hospitals, the findings cannot be generalized to all hospitals throughout the United States or abroad. Second, the study design was cross-sectional capturing hospital quality improvement activities and outcomes at a single point in time. As a result, the findings must be considered as net associations and not cause-and-effect relationships. Third, while using charge data rather than cost data involves some measurement issues, these have been mitigated by using condition-specific charge data. Also, one would like to have condition-specific outcome data on severity-adjusted mortality and complications, patient functional health status measures (Ware and Sherbourne 1992), and patient satisfaction (Nelson et al. 1989). Finally, there are limitations in using a single quantitative measure of culture at one point in time (Denison 1990; Siehl and Martin 1990). An advantage of the culture measure, however, is the collection of data from numerous individuals across different departments and levels of the organization, thereby permitting comparisons across organizations in the same industry (Sheridan et al. 1994).

These limitations not withstanding, the findings hold a number of important implications as well as suggesting avenues for further research.

FOSTERING QI IMPLEMENTATION

The significant association between emphasis on a group/developmental culture in a hospital and the degree of employee-reported QI implementation occurring provides important empirical support for those advocating the importance of culture to quality improvement work (Gaucher and Coffey 1993; Counte et al. 1992; Heilpern and Nadler 1992; Sheridan et al. 1994). If it is the case that a group-oriented/developmentally oriented culture promotes greater implementation of quality improvement work, then larger-size health care organizations, which tend to be more hierarchically and bureaucratically organized, face particular challenges.

Figure 2: Path Coefficients for Common Set of Hospitals for All Model Variables ($N = 31$)



() Indicate correlation coefficients.

$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

[a]Average Betas across the 12 equations–six for charges and six for length of stay.

R_1 through R_5 = Residual paths or unexplained variance.

The findings also suggest that hospitals using a prospector-like approach emphasizing empowerment, decentralized control, "just-in-time" training, and flexibility are more likely to be successful in their implementation efforts than hospitals that emphasize more centralized control, stick with fairly traditional approaches to quality improvement work, and focus more on single departments or areas of activity. The willingness to experiment typically associated with the prospector approach takes on added significance in the light of recent national data indicating that 44 percent of hospitals report either using a combination of the Deming (1986), Juran (1988), or Crosby (1979) approaches or developing their own approach (Barsness, Shortell, Gillies, et al. 1993). Using a prospector approach may be particularly challenging for hospitals traditionally operating under more centralized government auspices (e.g., Canada, United Kingdom, Western Europe).

Whether or not a hospital has yet adopted all criteria considered essential for CQI/TQM does *not* appear to make a difference in regard to the actual degree of quality implementation that has occurred. What appears to matter is whether the hospital has a culture that supports QI work and an approach that encourages flexible ways of implementing it rather than whether the hospital meets certain definitional criteria.

IMPLEMENTATION AND OUTCOMES

The relationship between implementation and outcomes is largely a story involving hospital size and culture. It appears that implementing quality improvement work in larger-size hospitals with more bureaucratic cultures is a difficult task. In turn, larger-size hospitals had poorer clinical efficiency as measured by length of stay and charges for the six clinical conditions. Analysis of the individual implementation subscales revealed that *specific plans to improve quality* (i.e., strategic quality planning) *by those who can do something about it* and *providing people with the tools and authority* (i.e. empowerment and training) to carry out quality improvement work appear to be most consistently associated with superior clinical efficiency.

SUGGESTIONS FOR FURTHER RESEARCH

As improving quality processes and patient outcomes become more important public policy issues in the evolving world of health care reform, both in the United States and abroad, the need will increase for a better understanding of quality improvement theories–of what seems to work and what does not–and for identifying the key organizational and environmental factors that appear to make a difference. This study provides a conceptual and empirical foundation for such further explorations by establishing a relationship between culture, QI implementation, perceived patient outcomes of care, and selected measures of clinical efficiency. Further research is needed to (1) address issues of the relationship between CQI implementation, specific clinical processes of care, and *objectively* derived clinical and patient outcome measures; (2) examine whether subunits of health care organizations can achieve "pockets of improvement" in the absence of an organization-wide cultural commitment (*Group Health Incorporated Progress Notes* 1993; Speroff 1993); (3) determine the exact mechanisms or processes by which group and developmental cultures operate to improve quality (Sheridan et al. 1994); and (4) examine differences between early and later adopters of CQI/TQM.

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NOTE

1. A copy of the questionnaire can be obtained by contacting the senior author.

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